REMARKS

Claims 4, 5, 10, 11 and 14 are presented for consideration, with Claims 4, 10 and 14 being independent.

Claims 4, 10 and 14 have been amended to further distinguish Applicant's invention from the cited art. Claims 1-3, 6-9, 12 and 13 have been cancelled.

Claims 1, 2, 4, 5, 7, 8, 10, 11, 13 and 14 stand rejected under 35 U.S.C. §103 as allegedly being obvious over the Patnaik article in view of Adeli '394. In addition, Claims 3 and 9 stand rejected as allegedly being obvious these citations and further in view of the Lingen article, and Claims 6 and 12 stand rejected as allegedly being obvious over Patnaik, Adeli and the Dickinson article. These rejections are respectfully traversed.

Claim 4 of Applicant's invention relates to a method of optimally designing a structure in an area comprising a step of obtaining a solution of a structure optimal designing problem having a first solution process to solve an optimization problem of a first evaluation function for a status variable vector and a design variable vector, wherein the design variable vector is a rate of existence to a structural member in each divided area of the area, and the status variable vector is a displacement in each node of the divided area. As claimed, the first solution process comprises a design variable update step of reading the design variable vector and the status variable vector stored in a first storage unit, updating the design variable vector, and storing the updated design variable vector into the first storage unit. In addition, a status variable update step a) reads the design variable vector and the status variable vector stored in a second storage unit, b) performs a second solution process to solve an optimization problem of a second evaluation function for the status variable vector and the design variable vector so as to obtain

the status variable vector which minimizes the second evaluation function as a solution, c) updates the status variable vector with the solution of the optimization problem of the second evaluation function, and d) stores the updated status variable vector into the second storage unit.

The second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between a nodal force vector and the status variable vector on which a global stiffness matrix is operated, and the second solution process comprises a conjugate gradient method, including a preconditioning step of executing preconditioning on a nodal force vector based on a global stiffness matrix. Additional steps include determining whether the update in the design variable update step and the update in the status variable update step are to be terminated, and outputting an image of the structure corresponding to the design variable vector and the status variable vector after the updates are terminated, and otherwise returning to the design variable update step to update the design variable vector.

Claim 4 has been amended to further recite that at the preconditioning step, when a diagonal component of the global stiffness matrix is 0, a component of the nodal force vector corresponding to a row or column including the diagonal component is set to 0. Support for the claim amendments can be found, for example, on page 28, lines 19-27 of the specification.

In accordance with Claim 4 of Applicant's invention, a high performance method of optimally designing a structure in an area can be provided.

The primary citation to Patnaik relates to optimizing a procedure for automated structural design, and in particular discusses an optimality criteria method for the minimum weight design of structures subjected to multiple load conditions. An optimality criteria computer code is said to be composed of modules, including analysis modules that can include

an integrated force method of analysis. The Office Action asserts, on page 4, that this method (relying on equation 27) discloses Applicant's claimed status variable update step of performing a second solution process to solve an optimization problem of a second evaluation function for an updated status variable vector and an updated design variable vector. The Office Action acknowledges, however, that Patnaik does not teach the second evaluation function to correspond to a norm of a residual vector which is obtained as a difference between a nodal force vector and the updated status variable vector on which a global stiffness matrix is operated.

The secondary citation to Adeli relates to a computational model provided for design automation and optimization, and was cited to compensate for the deficiencies in Patnaik. In this regard, equation 41 (column 18, line 9) is said to support the assertion that Adeli teaches a second evaluation function.

Even assuming, *arguendo*, Patnaik and Adeli could have been combined in the manner proposed in the Office Action, it is submitted that such a combination still fails to teach or suggest Claim 4 of Applicant's invention. For example, the proposed combination does not teach or suggest, among other features, that at the preconditioning step, when a diagonal component of the global stiffness matrix is 0, a component of the nodal force vector corresponding to a row or column including the diagonal component is set to 0.

Further, the proposed combination of art does not teach or suggest that the second solution process comprises a conjugate gradient method and includes a preconditioning step of executing preconditioning on a nodal force vector based on a global stiffness matrix. In rejecting Claim 4, the Office Action indicates, on page 6, that the "limitations" have already been

discussed in Claim 1. These previously-presented features of Claim 4, however, were not part of Claim 1.

Claims 10 and 14 relate to an information processing apparatus and a program stored in a computer readable storage medium, respectively, and correspond to Claim 4. These claims are thus also submitted to be patentable for at least the reasons discussed above.

Accordingly, reconsideration and withdrawal of the rejection of the claims under 35 U.S.C. §103 in view of Patnaik and Adeli is respectfully requested.

The Lingen article relates to a system having an iterative algorithm for solving non-symmetric systems of equations and was cited for teaching a conjugate residual (GCR) method.

The Dickinson article relates to conjugate gradient methods for three-dimensional linear elasticity and is relied on for its teaching of sending a nodal force vector to 0 in a preconditioning step.

Both Lingen and Dickinson fail, however, to compensate for the deficiencies in the proposed combination of Patnaik and Adeli as discussed above. Moreover, Claims 3, 6, 9 and 12 have been cancelled. Thus, reconsideration and withdrawal of the rejections of Claims 3, 6, 9 and 12 are respectfully requested.

Thus, it is submitted that Applicant's invention as set forth in independent Claims 4, 10 and 14 is patentable over the cited art. In addition, dependent Claims 5 and 11 set forth additional features of Applicant's invention. Independent consideration of the dependent claims is respectfully requested.

In view of the foregoing, reconsideration and allowance of this application is deemed to be in order and such action is respectfully requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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